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ABSTRACT

This study, which is a companion to a study on 10-year enrollment and graduation patterns for new freshmen and transfers, sought to quantify how much more likely college students were to graduate if they were transfers, were enrolled continuously, were mostly full-time, and began their academic careers with good first-semester grade point averages (GPAs). The number of credits transferred was included to help explore why transfers were more likely to graduate. Age, gender, and ethnicity were used to control for differences between and within freshman and transfer groups. Graduation was checked at three points (4-, 6-, and 10-years). The study was based on 2,459 Boise State University (Idaho) students who entered in fall 1989; 1,692 were new freshmen and 767 were new transfers. The study found that transfer students were more likely to graduate than new freshmen, with the most important variables in predicting graduation being full-time enrollment and first semester grade point average. Discontinuous enrollment reduced the odds of graduation. For each semester of credits transferred, students significantly improved their odds of graduating. Age, gender, and ethnicity had little effect on predicting graduation. Appended is information on the logistic regression model. (SM)

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Predicting the Probability of Graduating After Four, Six, and Ten Years

Research Report 2000-01

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2

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Boise State University
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Predicting the Probability of Graduating After Four, Six, and Ten Years

Abstract

This study was a companion to Research Report 99-04, *Ten Year Enrollment and Graduation Patterns for 1989 New Freshmen and Transfers*. The prior study established that there were differences in graduation rates between freshmen and transfers and that both groups engaged in a variety of enrollment patterns such as discontinuous enrollment and changing from full-time to part-time status that undoubtedly affected time to graduation. The current study sought to quantify specifically how much more likely students were to graduate if they were transfers, enrolled continuously and mostly full-time, and began their academic career with a good first semester GPA. A second question was whether these effects faded over time. The number of credits transferred to the institution was also included in the study as a partial way of exploring why transfers were more likely to graduate. Age, gender, and ethnicity were included in the study to control for differences between and within the freshman and transfer groups.

Among the findings of the study:

- Transfers were 6.8 times more likely than freshmen to graduate after four years, 4.1 times as likely after six years, and 3.1 times as likely after ten.

- The most important variables in predicting graduation for both groups were continuous enrollment, mainly full-time enrollment, and first semester GPA. Demographic variables played mainly a minor role, though minority group membership decreased the chances of graduating for transfer students.

- Freshmen who continuously enrolled were about twice as likely to graduate as their discontinuously enrolled counterparts after four years. Mainly full-time freshmen were about 2.5 times as likely to graduate.

- Discontinuous enrollment also reduced the odds of graduating for transfer students. However, students who attained satisfactory first term GPAs could enroll discontinuously without hurting their odds of graduating. Those with low GPAs, however, reduced their odds of graduating by a factor of 9 if they also enrolled discontinuously.

- A good start in college as symbolized by GPA was especially important for freshmen. For each unit increase in first semester GPA (e.g., from 2.00 to 3.00), the chances of graduating about doubled.

- For transfer students, mainly full-time enrollment boosted the odds of graduating by a factor of 3.8 after four years, 4.6 after six years, and 5.1 after ten years.

- For each semester's worth of credits transferred, students improved their odds of graduating by 60% after four years and 30% after six or ten years.

In terms of policy, this study again confirms that attention should be placed on helping students, especially freshmen, be academically successful during their critical first semester at the university. In addition, Boise State University may want to consider more aggressively wooing new transfer students.

Predicting the Probability of Graduating After Four, Six, and Ten Years

Introduction

Graduation is important. Legislators and the general public seem to think of it as the only reason students might be in college. National rankings of quality place a heavy emphasis on the percentage of freshmen who graduate. Federal reporting requires that potential students be informed of the percentage of freshmen who graduate within six years so they can make more informed decisions about where to attend college.

Boise State University has traditionally produced low figures on this important indictor (though other Idaho universities have, too). Some have speculated that the low graduation numbers are due to the fact that Boise State has served in the role as a community college for the region. This has meant that many students came with the goal of attaining job skills or simply trying out college then transferring, not graduating. It has meant that students come and go as their fortunes and outside responsibilities such as family and jobs dictate, perhaps finally graduating, but only after an extended time has elapsed since initial enrollment.

Others have speculated that many Boise State students are not well-prepared for college. This lack of preparation may be academic, with students becoming overwhelmed by the level of work required. It may be lack of motivation, with students actually not sure that they want to go to college and not willing to make all the sacrifices it requires to stay enrolled. It may be a lack of understanding in how to organize one's life to deal with the complexities of college. (See Belcheir, 1997 and Belcheir, Michener & Gray, 1998 for discussions of the factors related for retention for BSU freshmen.)

Prior Research

At the national level, Adelman (1999) recently completed the most current and comprehensive study of bachelor's degree attainment. Using a national sample of students who were followed

from tenth grade to age 30, and analyzing both high school and college transcripts, he concluded that the variables which boosted the odds of graduating the most were continuous enrollment, transferring (especially from a community college to a four-year college), and the trend in one's college grades. He found almost no demographic variables that related to the probability of graduating, though socioeconomic status provided a very modest contribution to eventual degree completion. The academic resources that a student brought to college, best evidenced by the rigor of their high school curricula, were important, but less so than first year college grades. In addition, students who accumulated few credits their first year or had a child by age 22 significantly reduced their odds of graduating, even after ten years.

Adelman (1999) was also able to provide a perspective on transferring that we at the local level are unable to determine. He found that more than half of the undergraduates attended more than one institution. He predicted that in the 1990s the U.S. will easily surpass a 60 percent multi-institutional attendance rate. He further found that the number of institutions attended by students had no effect on degree completion, but that such high rates of transfer make national comparisons of graduation rates an exercise in futility.

Local research (Belcheir, 1999) has shown that Boise State is an institution with a decidedly non-traditional student body, one with many of the characteristics described by Adelman. Almost half of the graduates in any given year have transferred to Boise State. Many students have families and full-time jobs. These students come and go, with about 45% of those who enroll for more than one term doing so by stopping out and then returning. Credit loads are adjusted from term to term with only slightly more than half of the freshmen who enrolled full-time their first semester remaining full-time for other semesters.

Boise State University research has also shown that transfer students graduate at higher rates than new freshmen (Belcheir, 1999), a finding much in line with Adelman's data. While the number of credits transferred provides a "leg up" on graduation, it was expected that this difference would disappear over ten years. It did not, leading to speculation that perhaps motivation or some prior experience on how to "manage" college led to improved graduation rates compared to freshmen.

Purpose of the Study

This study was designed to address four major questions:

1) How much does it help to be a transfer student compared to a freshman, after accounting for known differences between the two groups? How important are the number of transfer credits in improving the odds of graduating?
2) What role does discontinuous enrollment play in the odds of graduating, especially after ten years?
3) How important is first semester GPA and does that importance decrease over time?
4) Does full-time enrollment continue to be an important predictor of graduation, even after ten years?

Graduation was checked at three points in time. Four-year graduation rates were included because that is the traditional (though increasingly unlikely) time period to graduation. Six-year rates were included since that is now the amount of time that elapses before reporting figures to the federal government. Graduation was checked ten years after initial enrollment since that seemed to be the reasonable far-end of elapsed time needed before almost all new enrollees would have either graduated or left the institution.

Methodology

Who Was Studied

The study was based on students who arrived at the University for the Fall 1989 term (N=2,459). Of this group, 1,692 were new freshmen and 767 were new transfers. Two follow-up groups were then formed which included only students who returned for at least one additional semester. One was based on freshmen who returned at any point in the next ten fall terms (N=1,121 or 66% of the original group), while the other included transfers who returned (N=501 or 65% of the original group). These groups were formed in order to be able to include in the analysis some enrollment variables that made more sense if "one-timers" are eliminated.

Variables Included in the Study

The outcome of interest was graduation, specifically after four, six, and ten years. Re-enrollment was studied by checking each fall term file for the next ten years (through Fall 1998) to see who was still here. Students were considered graduated if they were included on any semester's graduation list through Spring semester of 1998. Students who re-enrolled after receiving a degree continued to be counted as a graduates.

The main variables of interest were initial enrollment status (freshman or transfer), form of enrollment (continuous or discontinuous), full-time vs. part-time enrollment, first semester GPA, and number of credits transferred. Students were considered mainly full-time if more than half of their semesters of enrollment were for 12 or more credits. They were considered continuous enrollees if all the fall semesters they were enrolled in were consecutive.

The demographic variables of gender, ethnicity, and age were included mainly to control for any differences that might affect the main variables of interest. It was known, for example, that transfer students were older than freshmen so including age would help remove any effects that might obscure the overall differences between freshmen and transfers.

The Analysis

The first question of how much being a transfer student improved the odds of graduating was based on the total group (n=2,459). The other variables included in the analysis were there to remove potential differences between freshmen and transfers. Having established that freshmen and transfers were quite different from one another, the remaining questions were answered using the reduced group of students who returned for additional terms and conducting separate analyses for freshmen and transfer students.

Because graduation is a variable with only two values (yes or no), logistic regression was used to assess the probability of graduating after four, six, and ten years. The advice of Hosmer and Lemeshow (1989) helped guide the analysis. First, univariate analyses were conducted and all predictor variables with a probability level of .25 or less were retained. These were then used in

multivariate analyses where simple main effects and interactions were tested. Those variables which were significant at the .05 level or smaller were retained for the final model, including any interaction terms for the major variables of interest. The results are given in terms of odds ratios that show how much the odds change as the variable changes. Readers desiring further information on this technique are referred to Appendix A.

Results

How did freshman vs. transfer status change the probability of graduating?

All other things being equal, being a transfer student provided a highly significant boost in the odds of graduating, especially after four years. Compared to freshmen, transfer students were over 6.8 times more likely to graduate after four years,. 4.1 times as likely after six years, and 3.1 times as likely after ten. Thus, although the differences in the odds of graduating narrowed as more time was added, transfer students always remained significantly more likely to graduate than freshmen. (See Tables 1, 2, and 3 in Appendix B for further details.)

There were several signs, however, that freshmen and transfer students were different populations and that discussions needed to include other factors beyond initial enrollment status in order to provide a complete picture. For example, results showed that the relationship between first semester GPA and the probability of graduating was different for freshmen and transfer students at all three points in time. While transfers were more likely to graduate than freshmen at low GPA levels, these differences disappeared at higher GPA levels.

In addition, differences were found between freshmen and transfers in the odds of graduating after four years depending upon whether the students were continuously or discontinuously enrolled. While enrolling discontinuously caused the odds of graduating to drop for freshmen, discontinuous enrollment didn't make much difference in the chances of graduating for transfer students, perhaps because of the credits they were transferring to the university or because continuous enrollment had different meanings for new freshmen compared to new transfers.

Because of these differences, the remaining analyses were conducted separately for freshmen and transfers. In addition, the group was reduced to only students who enrolled for multiple fall terms. This gave more meaning to the continuous enrollment variable, so that continuous enrollment didn't include students who only attended for one fall semester.

What Predicted the Graduation of Freshmen Who Enrolled For Multiple Fall Terms?

Continuous enrollment, mainly full-time enrollment, and first semester GPA helped predict graduation at all three time points for returning freshmen. Not surprisingly, freshmen who enrolled continuously were more likely to graduate than freshmen who did not. After four years, students who enrolled continuously were about twice as likely to graduate as their "stop-out" counterparts. At six and ten years, the effects of continuous enrollment couldn't be considered without also considering whether the student was mainly full-time. As shown by the table below, for students who were mainly full-time enrollees, the odds of graduating after six years dropped dramatically for students who did NOT enroll continuously. The odds changed very little, however, for students who were part-time, probably because they hadn't accumulated enough credits to graduate in any case. After ten years, the odds were much closer for full-time enrollees, whether they enrolled continuously or discontinuously. Part-time enrollees still had much reduced chances of graduating, whether they were continuous or discontinuous enrollees.

Odds Ratios for graduation based on full-time and continuous enrollment after six and ten years

	After six years		After ten years	
Enrolled:	Continuous	Discontinuous	Continuous	Discontinuous
Mainly FT	1.00	0.29	1.00	0.91
Part-time	0.08	0.10	0.09	0.19

As found in prior studies of retention, first semester GPA had a strong effect on the probability of graduating. This was true whether looking at four-year, six-year, or ten-year graduation models. At the four year mark, each unit increase in GPA improved the probability of

graduating by a factor of 1.85. At six years, the odds were 2.05, while at ten years, the odds improved by a factor of 1.87, all else being equal.

Demographic variables such as gender, ethnicity, and age were generally not needed to control for differences between groups. Only twice were they included in the model. For the four-year model, age was included with results indicating that being older increased the odds of graduating for new freshmen. For the ten year model, being female increased the odds of graduating. See Tables 4, 5, and 6 for further details.

What Predicted the Graduation of Transfers who Enrolled for Additional Fall Terms?

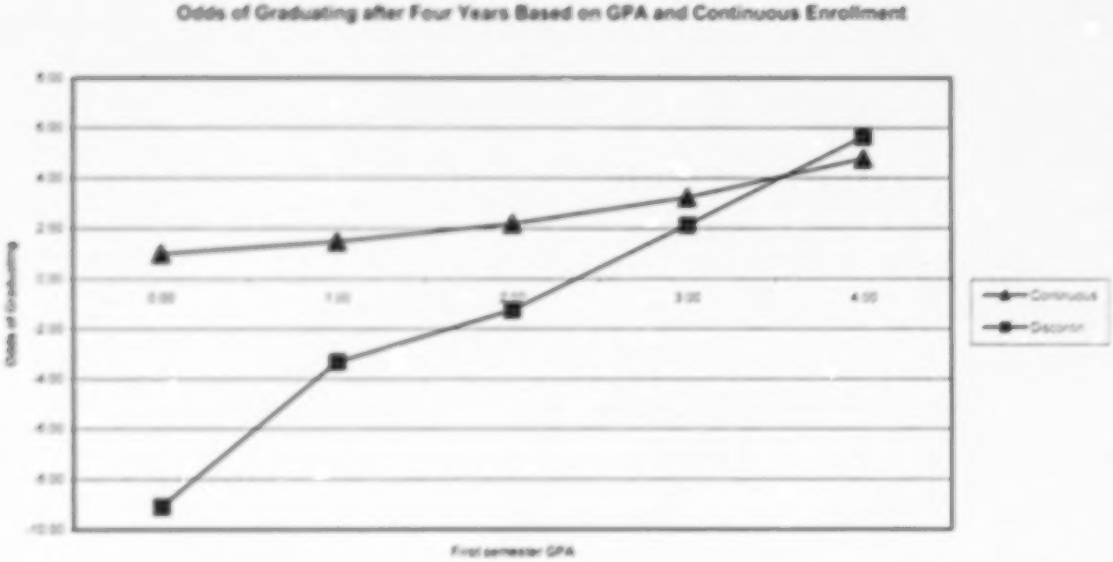
The same variables were present in most of the transfer predictions that were in the freshmen predictions. Continuous enrollment, mainly full-time enrollment and first semester GPA all predicted graduation. In addition, number of transfer credits also helped predict graduation after four, six, and ten years.

The impact of transfer credits was an area of particular interest since it provided a possible way of explaining why transfer students were generally more likely to graduate than were freshmen. For this study, after four years, each 15 credits increased the odds of graduating by 60%. After six and ten years, each 15 credits increased the odds of graduating by 30%. Thus, the boost to graduation was highest early on and then leveled out. Although transfer credits were a significant help in reaching graduation, the effect was actually more potent for some other variables.

Mainly full-time enrollment, for example, was an especially strong predictor, even as long as ten years after initial enrollment. Transfers who were mainly full-time had odds of graduating that were 3.8 times greater after four years, 4.6 times greater after six years, and 5.1 times greater after ten years. This trend over time was contrary to expectations since given more time, we would assume that taking more credits would be less important.

Continuous enrollment also had a strong impact on the odds of graduating. After six years, continuous enrollees were four times more likely to have graduated. At both the four- and ten-

year time points, however, discussion of the effect had to account for the level of GPA performance the first semester at Boise State. Further analysis indicated that transfer students who performed very poorly their first semester were especially handicapped in reaching graduation if they then enrolled discontinuously. As students attained higher GPAs, however, this disparity in odds of graduation disappeared between the continuous and discontinuous enrollees. Figure 1 illustrates the relationship using continuous enrollees who attained a 0.00 GPA their first semester as the group to which all other groups are compared.[1]


Odds of Graduating after Four Years Based on GPA and Continuous Enrollment
Odds of Graduating
First semester GPA
Continuous
Discontin

	First Semester Grade Point Average				
Odds of Graduating	0.00	1.00	2.00	3.00	4.00
Continuously enrolled	**1.00**	**1.48**	**2.18**	**3.23**	**4.77**
Discontinuously enrolled	**0.11** *(- 9.09)*	**0.30** *(- 3.33)*	**0.80** *(-1.25)*	**2.13**	**5.64**

It is obvious from the graph that first semester GPA is highly predictive of graduation, especially for discontinuous enrollees.

[1] To better illustrate the magnitude of the differences, odds ratios of less than 1.0 were transformed into reverse odds and given a negative sign, e.g., an odds ratio of .11 became -9.09.

As found for the freshmen, few of the demographic variables were needed as controls for the study. Age was significant at the six-year mark, with younger transfers being more likely to graduate than their older counterparts. Ethnicity was also a significant factor at the six and ten-year mark. At six years, white non-Hispanics were almost three times as likely to graduate as their minority counterparts, while at ten years they were almost twice as likely to graduate.

Summary and Conclusions

This study sought to answer the question of what predicted graduation and if these predictions were modified as the time to graduation moved from four to six to ten years. In terms of the effect of time, results showed that, in general, variables that were highly significant in predicting graduation at four years had less impact by the time ten years had elapsed. However, what should be included in predicting graduation remained remarkably stable so that the same variables kept appearing as significant. These variables were continuous enrollment, mainly full-time enrollment, and first semester GPA for both freshmen and transfers.

This study further confirmed the advantage that transfer students had over new freshmen in reaching graduation. Though freshmen closed the gap in their probability of graduating over time, they never fully caught up. This difference was undoubtedly due in part to the number of credits which transfer students were likely to bring with them to the institution, giving them a "leg up" on graduation. However, transfer students' edge was also probably due to less tangible things such as clearer goals, increased motivation, and prior experience that was gained from already attending college at least once.

Continuous and full-time enrollment were variables which had somewhat different roles for freshmen and transfers. For freshmen, at the four-year mark, both more than doubled the odds of graduating. After the four-year mark, the effects of one couldn't be explained without also including the other. For mainly full-time enrollees, enrolling discontinuously had a strong impact on the odds of graduation after six years, while the effect was small for part-time enrollees. After ten years, however, the effects of discontinuous enrollment were more minor. Thus, it appears that freshmen should first be advised that continuous and full-time enrollment will help them reach graduation in the most timely fashion (with mainly full-time and continuous

enrollees having odds of graduating that were ten times those of part-time and discontinuous enrollees after six years). If they cannot attend continuously and full-time, it is better to attend full-time and take a semester off here and there than it is to enroll part-time and enroll continuously, according to the odds.

For transfers, full-time enrollment had a strong effect that increased somewhat over time so that after ten years, mainly full-time transfer students were five times more likely to have graduated than there part-time counter parts. The effects of continuous enrollment, on the other hand, were generally tied to how well the transfer students performed their first semester with the effects of first semester GPA showing a much stronger relationship for discontinuous enrollees than continuous enrollees.

Indeed, first semester GPA probably played the most important role in increasing the odds of graduation. The impact was clear in predicting freshman graduation for those who returned for additional fall semesters. In this case, each unit increase in GPA approximately doubled the odds of graduating at four, six, and ten years. Thus, a student with a 4.00 GPA would be approximately sixteen times more likely to graduate than a student with a 0.00 first semester GPA. Prior studies have shown the importance of this variable in predicting retention, and this study extends those findings to graduation.

For transfers, the effects of GPA and continuous enrollment generally were bound together with GPA showing a stronger effect for discontinuous enrollees. For example, for continuous enrollees, those with a 4.00 GPA were almost five times as likely to graduate after four years as those with a 0.00 GPA, but for discontinuous enrollees, the difference was fifty times. Considered another way, transfer students who performed poorly their first semester (i.e., 0.00 GPA) but continuously enrolled were nine times more likely to have graduated after four years than their discontinuously enrolled counterparts. However, for those at high GPA levels, the difference between continuous and discontinuous enrollment was insignificant. Thus, first semester GPA always made a difference in the odds of graduating, but the greatest difference was for students who dropped in and out. Transfer students who perform poorly their first semester should be advised to continue and not stop their studies.

Though the demographic variables of age, ethnicity, and gender were included in the study, they generally had little effect on the prediction of graduation. For freshmen, students who were older were more likely to graduate after four years and women were more likely to graduate after ten years. For transfers, white non-Hispanics were more likely to graduate after six and ten years, while younger students were more likely to graduate after six years.

In terms of policy, this study confirms that attention should be placed on helping students be academically successful their first semester. This is the variable with the strongest effect on the odds of graduating. It is also where the university has the most control. It is probably easier to put in place academic aid than it is to make changes that will cause students to attend full-time and continuously. While increased financial aid would probably also increase the number of continuous, full-time enrollees, finances are often not the only consideration for our student population. The university should closely consider how we can increase the first semester grade point averages. The payoff will be seen in increased enrollment and graduation rates for both freshmen and transfers.

In addition, the University may want to consider more aggressively pursuing new transfer students. Both local and national studies indicate that this is a group that is more likely to succeed in college. More transfer students translate into more enrollments in upper division courses, which are funded at higher levels than lower division courses and which half of new freshmen never reach. In addition, more transfer students mean more graduates of Boise State University, something which can only benefit the university in the long run.

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Appendix A
Interpreting the Results of a Logistic Regression

Logistic regression is used when the researcher wants to be able to employ a group of variables to explain or predict an outcome. Normally, multiple regression would be the preferred approach, but it requires an outcome such as grade point average that takes on a full range of values. In the case of predicting graduation, our outcome of interest, the only values are "yes" they graduated or "no" they did not.

The solution is to set up a hypothetical latent (or unseen) variable which takes on a full range of values. In our case, the latent variable is probability of graduating, and its value is based on the values of the variables used to predict it. The value of probability of graduating can range from "0" (absolutely no chance) to "1" (it's a sure thing). Thus, for example, all students who were full-time freshmen enrollees and obtained a 3.0 GPA their first semester might have a probability of graduating of .75. This number would imply that students who fit that profile were likely to graduate, even though some of them would not. The number is approximated based on the actual proportion of students with those characteristics who graduated.

Probability is used in establishing the odds. The odds indicate how often something happens relative to how often it does not occur. The probability is transformed into the odds by taking the probability of the event occurring and dividing it by the probability of the event NOT occurring. For example, if the probability of graduating in four years is .50 then the odds of graduating are .50/(1-.50)=.50/.50=1, indicating that the probability of graduating and the probability of *not* graduating are the same.

An odds ratio is assigned to each predictor, indicating what kind of impact it has. A variable which has no impact has an odds ratio of "1" (i.e., the odds are even whatever the value of the variable). Suppose for example, that men had a probability of graduating in four years of .40 while women had a probability of graduating of .60. First, the odds of graduating would need to be calculated for each group. This would be .67 (or .40/.60) for men and 1.5 (or .60/.40) for

women. The odds ratio of women graduating compared to men would then be 1.5/.67 or 2.24. We would therefore conclude that the odds of women graduating is more than twice that of men.

It is important to understand the referent of the odds ratio since the odds can be expressed either way. In our prior example, the odds ratio was 2.24 because women were compared to men. However, if men had been compared to women the odds would have been .45 (.67/1.5), indicating that the odds of men graduating was less than half that of women. In general, the odds shown are expressed where the group coded "1" is compared to the group coded "0". The variable is typically named after the "0" coded group to aid in interpretation. When a variable has multiple levels, the odds ratio is interpreted as a one-unit increase (e.g., as GPA moves from 2.00 to 3.00).

Appendix B
Models for Logistic Regression Equations[2]

Table 1. Logistic regression model for predicting graduation after four years for all new Fall 1989 students

Variable	Parameter Estimate	Std. Error	Wald χ^2	Pr > χ^2	Std. Estimate	Odds Ratio
Intercept	-4.8907	0.3645	180.02	0.0001	--	--
Freshman	1.9102	0.4422	18.66	0.0001	0.49	6.754
Mainly Fulltime	-1.6932	0.2297	54.36	0.0001	-0.43	0.184
Continuous enrollment	-0.9067	0.2205	16.90	0.0001	-0.22	0.404
1st semester GPA	1.0183	0.1082	88.50	0.0001	0.66	2.769
White non-Hispanic	-0.4882	0.2126	5.27	0.0217	-0.09	0.614[3]
Age	0.0289	0.0090	10.35	0.0013	0.10	1.029
Continuous X FT	0.8389	0.3780	4.93	0.0265	0.14	2.314
Continuous X Frosh	0.7360	0.3050	5.82	0.0158	0.11	2.088
Frosh X GPA	-0.3368	0.1444	5.44	0.0197	-0.24	0.714

Table 2. Logistic regression model for predicting graduation after six years for all new Fall 1989 students

Variable	Parameter Estimate	Std. Error	Wald χ^2	Pr > χ^2	Std. Estimate	Odds Ratio
Intercept	-3.0346	0.2186	192.67	0.0001	--	--
Freshman	1.4207	0.3351	17.97	0.0001	0.36	4.140
Mainly Fulltime	-2.0219	0.1930	109.77	0.0001	-0.51	0.132
Continuous enrollment	-0.6907	0.1338	26.64	0.0001	-0.17	0.501
1st semester GPA	0.9854	0.0762	167.40	0.0001	0.64	2.679
White non-Hispanic	-0.6432	0.1754	13.44	0.0002	-0.11	0.526[4]
Continuous X FT	0.7839	0.3190	6.04	0.0140	0.13	2.190
Frosh X GPA	-0.3270	0.1166	7.8638	0.0050	-0.23	0.721

[2] Note that all equations are based on the odds of graduating and that categorical variables are named so that the name indicates which group is coded as the "0" or reference group.

[3] The reverse odds show that white non-Hispanics are 1.63 times more likely to graduate than minority group members are after four years.

[4] The reverse odds show that white non-Hispanics are 1.9 times more likely to graduate than minority group members are after six years.

Table 3. Logistic regression model for predicting graduation after ten years for all new Fall 1989 students

Variable	Parameter Estimate	Std. Error	Wald χ^2	Pr > χ^2	Std. Estimate	Odds Ratio
Intercept	-2.5159	0.1908	173.93	0.0001	--	--
Freshman	1.1387	0.2899	15.43	0.0001	0.29	3.123
Mainly Fulltime	-1.7910	0.1322	183.43	0.0001	-0.45	0.167[5]
Continuous enrollment	0.6401	0.1095	34.18	0.0001	0.16	1.897
1st semester GPA	0.8863	0.0654	183.80	0.0001	0.58	2.426
White non-Hispanic	-0.3852	0.1559	6.11	0.0135	-0.07	0.680[6]
Female	-0.2163	0.0982	4.85	0.0276	-0.06	0.805[7]
Frosh X GPA	-0.2637	0.1041	6.41	0.0113	-0.19	0.768

Table 4. Logistic regression model for predicting graduation after four years for freshmen who enrolled more than one fall term

Variable	Parameter Estimate	Std. Error	Wald χ^2	Pr > χ^2	Std. Estimate	Odds Ratio
Intercept	-4.5179	0.4685	92.98	0.0001	--	--
Continuous enrollment	-0.7038	0.2290	9.44	0.0021	-0.193	0.495[8]
Mainly full-time	-0.9204	0.3262	7.96	0.0048	-0.225	0.398[9]
Age	0.0551	0.0155	12.68	0.0004	0.149	1.735[10]
1st Semester GPA	0.6176	0.1312	22.14	0.0001	0.349	1.854

Table 5. Logistic regression model for predicting graduation after six years for freshmen who enrolled more than one fall term

Variable	Parameter Estimate	Std. Error	Wald χ^2	Pr > χ^2	Std. Estimate	Odds Ratio
Intercept	-1.8905	0.2603	52.75	0.0001	--	--
Continuous enrollment	-1.2272	0.1666	54.24	0.0001	-0.336	0.293
Mainly full-time (FT)	-2.4876	0.3819	42.42	0.0001	-0.609	0.083
1st semester GPA	0.7194	0.0909	62.60	0.0001	0.406	2.053
Continuous X FT	1.4592	0.5015	8.47	0.0036	0.284	4.303

[5] The reverse odds indicate that mainly full-time students were 5.9 times more likely to graduate than discontinuously enrolled students.
[6] The reverse odds showed that white non-Hispanic students were 1.47 times more likely to graduate after ten years than minority students were.
[7] The reverse odds showed that females were 1.24 times more likely to graduate after ten years than men were.
[8] The reverse odds were 2.02, indicating that continuous enrollees were more than twice as likely to graduate as "stop-outs."
[9] The reverse odds were 2.51, indicating that mainly full-time enrollees were 2.5 times more likely to graduate after four years.
[10] Based on each ten-year increase in age.

Table 6. Logistic regression model for predicting graduation after ten years for freshmen who enrolled more than one fall term

Variable	Parameter Estimate	Std. Error	Wald χ^2	Pr > χ^2	Std. Estimate	Odds Ratio
Intercept	-1.2230	0.2363	26.77	0.0001	--	--
Continuous enrollment	-0.0900	0.1502	0.36	0.5490	-0.02	0.914
Mainly full-time	-2.3632	0.3227	66.36	0.0001	0.35	1.868
1st semester GPA	0.6248	0.0767	66.36	0.0001	0.35	1.868
Female	-0.2831	0.1373	4.25	0.0391	-0.08	0.753
Continuous X FT	0.7956	0.4041	3.88	0.0490	0.16	2.216

Table 7. Logistic regression model for predicting graduation after four years for transfers who enrolled more than one fall term

Variable	Parameter Estimate	Std. Error	Wald χ^2	Pr > χ^2	Std. Estimate	Odds Ratio
Intercept	-2.0781	0.4719	19.40	0.0001	--	--
Continuous enrollment	-2.1723	0.8460	6.59	0.0102	-0.58	0.114[11]
Mainly full-time	-1.3407	0.2635	25.89	0.0001	-0.35	0.262[12]
1st semester GPA	0.3907	0.1498	6.80	0.0091	0.23	1.478
# of transfer credits	0.0323	0.0043	55.70	0.0001	0.50	1.623[13]
Continuous X GPA	0.5848	0.2794	4.38	0.0363	0.44	1.795

[11] The reverse odds were 8.77 indicating that continuous enrollees were almost nine times more likely to graduate after four years than discontinuous enrollees were.
[12] The reverse odds were 3.82 indicating that mainly full-time enrollees were almost four times more likely to graduate after four years compared to part-time enrollees.
[13] Based on each 15 credits accrued.

Table 8. Logistic regression model for predicting graduation after six years for transfers who enrolled more than one fall term

Variable	Parameter Estimate	Std. Error	Wald χ^2	Pr > χ^2	Std. Estimate	Odds Ratio
Intercept	0.0034	0.4884	0.00	0.9944	--	--
Continuous enrollment	-1.4263	0.2361	36.51	0.0001	-0.38	0.240[14]
Mainly full-time	-1.5202	0.2499	37.00	0.0001	-0.39	0.219[15]
1st semester GPA	0.5156	0.1191	18.74	0.0001	0.31	1.675
# of transfer credits	0.0189	0.0041	21.26	0.0001	0.29	1.329[16]
White non-Hispanic	-1.0507	0.3475	9.14	0.0025	-0.18	0.350[17]
Age	-0.0394	0.0172	5.28	0.0216	-0.15	0.961[18]

Table 9. Logistic regression model for predicting graduation after ten years for transfers who enrolled more than one fall term

Variable	Parameter Estimate	Std. Error	Wald χ^2	Pr > χ^2	Std. Estimate	Odds Ratio
Intercept	0.0145	0.4248	0.00	0.9727	--	--
Continuous enrollment	-1.7359	0.6010	8.34	0.0039	-0.46	0.176[19]
Mainly full-time (FT)	-1.6321	0.2308	49.99	0.0001	-0.42	0.196[20]
1st semester GPA	0.2094	0.1397	2.25	0.1338	0.12	1.233
# of transfer credits	0.0199	0.0042	22.55	0.0001	0.31	1.348[21]
White non-Hispanic	-0.6432	0.3183	4.08	0.0433	-0.11	0.526[22]
Continuous X GPA	0.5412	0.2163	6.26	0.0123	0.41	1.718

[14] The reverse odds were 4.17 indicating that continuous enrollees were more than four times as likely to graduate in six years.
[15] The reverse odds were 4.57 indicating that mainly full-time enrollees were more than four times as likely to graduate after six years than were part-time enrollees.
[16] Based on each 15 credits transferred.
[17] The reverse odds were 2.857, indicating that white non-Hispanics were almost three times as likely to graduate after six years compared to their minority counterparts.
[18] Each ten-year decrease in age improved the odds of graduating by 1.483.
[19] The reverse odds were 5.68, indicating that continuous enrollees were still over five times as likely to graduate after ten years compared to discontinuous enrollees.
[20] The reverse odds were 5.1 in favor of mainly full-time enrollees.
[21] Based on each 15 credits transferred.
[22] The reverse odds were 1.9, indicating white non-Hispanics were almost twice as likely to graduate after ten years compared to minority members.